



Figure 1. One of the rarest and oddest frogs in the Southwest, the barking frog was confirmed on Coronado National Memorial (Arizona) in 1993. This discovery, apparently of a thriving population, provided an unexpected opportunity to study this reclusive species, whose natural history is almost totally unknown.

Ground-truthing a troll

Studying the barking frog at Coronado National Memorial

By CECIL SCHWALBE AND BARBARA ALBERTI

LIKE THE SUBTERRANEAN BEINGS IN Scandinavian mythology that lurked underground for unwary prey, the barking frog (*Eleutherodactylus augusti* [fig. 1]) often waits under rocks or in holes and crevices for dinner to wander by, a dinner of invertebrates, not goats or humans. One of the rarest, and oddest, frogs in the Southwest, the barking frog is known in the United States only from isolated localities in southern Arizona, southeastern New Mexico, and west Texas. It ranges south in Mexico to the Isthmus of Tehuantepec, but nowhere is it considered abundant.

Until 1993, when an apparently thriving population of barking frogs was confirmed on Coronado National Memorial, the barking frog was known in Arizona only from a handful of individual frogs collected from four isolated mountain ranges. This discovery provided an unexpected opportunity to study this reclusive species, whose natural history is almost totally unknown. Biologists from the Cooperative Park Studies Unit at the University of Arizona (Tucson) and Coronado National Memorial are coordinating a study of this population with other university and agency scientists.

A member of the large tropical frog family Leptodactylidae, the barking frog is the only anuran in Arizona and New Mexico to undergo direct development; that is, females lay 20–80 eggs not in pools of water but in wet spots under rocks and in crevices, where barking frogs go through the tadpole stage in the egg, hatching into small frogs about a month later. The males supposedly tend the underground nest, guarding the eggs from small predators and hydrating the eggs by urinating on them.

Barking frogs are named for the explosive breeding call of the males, like the bark of a dog when heard at a distance, but a more guttural “whurr” at close range. At Coronado National Memorial, the call is less dog-like, often sounding like

the croak of a raven. We believe some barking frog populations may have been overlooked in Arizona because casual listeners may have thought calling barking frogs were Couch’s spadefoot toads (*Scaphiopus couchi*). At Coronado, most male barking

frogs call from small chambers or crevices. They sometimes respond to other calling males and vocalize while active on the surface. At Coronado, barking frogs are associated closely with limestone outcrops (fig. 2). In other areas, they may be found on rocks other than limestone, and in southeastern New Mexico they may occur in extensive rodent burrows in barren creosotebush flats.

In Arizona, breeding of barking frogs is tied closely to onset of the summer rainy season. There is



Figure 2. Habitat for the barking frog at Coronado is a surprisingly rugged limestone outcrop, replete with boulders and crevices.

The barking frog is named for the explosive breeding call of the male, like the bark of a dog when heard at a distance. However, at Coronado, the call sounds more like the croak of a raven.



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Figure 3 (above). Radiotranmitters belted around the waists of four study frogs helped researchers answer some basic questions about the life history of the reclusive animal. For example, home range was limited to the limestone outcrop where the frogs were originally captured, tagged, and released.

frenzied calling, apparently by most of the adult males in the population, during and following the first heavy (>1 cm; >0.4 in) rain, with fewer and fewer males calling during subsequent showers. We have not been fortunate enough to observe breeding by barking frogs at Coronado yet, but we did capture (and release) a single hatchling frog in 1996.

With funds provided by the National Park Service and Southwest Parks and Monuments Association and with the assistance of more than 30 volunteers, we captured, marked, and released 13 barking frogs on a single limestone outcrop in the memorial in 1996. Frogs were active from the first summer rain on June 30 until early September. Captured frogs ranged in size from the 0.83-g (0.03-oz), 21-mm-long (0.83-in [snout-to-vent length]) hatchling to a 55-g (1.93-oz), 85-mm (3.35 in) adult female. Using radiotelemetry (fig. 3), we followed four frogs for up to a month. Frogs roamed over much of the approximately 100 x 100-m limestone hill, but did not cross over to adjacent outcrops. Although often choosing to walk or climb, barking frogs are prodigious jumpers (fig. 4). Even while carrying a radiotranny belted around the waist, barking frogs easily made leaps of 70 cm (27.6 in) or more from boulder to boulder.

Based upon scat analysis and observations, barking frogs at Coronado feed on field crickets (*Gryllus* spp.), silverfish (*Lepisma saccharina*), centipedes (*Scolopendra* sp.), scorpions (*Vaejovis* sp.), and kissing bugs (*Triatoma* spp.). At other localities, they have been reported to eat cave crickets (*Ceuthophilus* spp.) and land snails (*Bulimulus* and *Succinea*).

Figure 4 (below). To help them negotiate the rough terrain of their rocky home, barking frogs feature tough "Vibram" soles on their feet.



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On the night following the first significant summer rainfall in 1997, we used over 30 volunteers to capture 15 barking frogs on several limestone outcrops on the memorial. We caught six frogs on our primary study site of the previous year, all recaptures, indicating that we have most of that subpopulation marked. Using PIT-tags (passive integrated transponders), we now have marked 22 frogs at five sites at Coronado. This summer we plan to bring a graduate student onto the project to further study the ecology of this interesting frog, to estimate population sizes using mark-recapture, to evaluate various monitoring methodologies, and to begin assessing metapopulation dynamics.

From our preliminary data and the scanty life history known of the species, we believe the barking frog has very low population densities and is long-lived. These characteristics make barking frog populations vulnerable to overcollecting; it is fortunate that the population at Coronado occurs on Park Service lands, where collecting is forbidden. This protected population will provide important information on the life history of this unusual species and perhaps allow us to test metapopulation models applicable to anuran conservation and management. **P_S**

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